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NOTES ON THE JAMAICAN AND CAYMAN ISLAND LIZARDS OF THE GENUS *CELESTUS*

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The collections of the Museum of Comparative Zoology afford a representative sample of the *Celesti* of Jamaica and the Cayman Islands¹ and, additionally, include types of 5 of the 8 forms recognized in the last revisions of Chapman Grant (1940b and c). Renewed examination of this material has confirmed the distinctness of certain forms but has placed in question the status of certain others. It is hoped to return to the study of this genus in these and other islands in the future but as an aid to students of this difficult group it has been thought desirable to place on record at this time the new conclusions as to the status of the Jamaican and Cayman forms.

The characters studied were: habitus; color pattern; dorsal, ventral and midbody scale counts, numbers of chin shields, and number of subdigital lamellae on the fourth digit; general body measurements; presence or absence of a keel and number of striae on dorsal scales. Head scalation was checked but not recorded on at least one individual of each species. No internal characters were used. It was impossible to sex the specimens except in the case of females carrying young, but it is doubtful if there is any sexual dimorphism in the species studied.

Only four species appear to be valid, as follows:

¹ One species, the giant form *Celestus occiduus* Shaw, is unrepresented. However, omission of this species from the present discussion appears to be justified in as much as its right to consideration as a still surviving form is very improbable. It has not been collected in over 100 years. Grant's suggestion that *hewardii* is a subspecies of this form cannot be seriously regarded.

Key to the Jamaican and Cayman forms of Celestus:

1. Adpressed limbs meet or fail to meet by less than length of fore-arm. Dorsal color pattern consisting of broken bars or rings 2
 Adpressed limbs fail to meet by greater than length of fore-arm. Dorsal color pattern not ringed 3
2. 19 or fewer subdigital lamellae on fourth toe of hind foot.
 Throat mottled *hewardii* Gray 1845
 Range: Central and western Jamaica and Portland Point.
 21 or more subdigital lamellae on fourth toe of hind foot.
 Throat not mottled *duquesneyi* Grant 1940a
 Range: Portland Point only.
3. 89-116 dorsal scales, occipital to point above vent 4
 125-139 dorsal scales, occipital to point above vent
 *barbouri* Grant 1940b
 Range: known only from Mandeville in south central Jamaica
 and Fern Gulley in north central Jamaica.
4. Tail dorsally with the same color and pattern as back
 *crusculus crusculus* Garman 1187
 Range: all of Jamaica, at least in the lowlands.
 Tail dorsally lighter than back and without pattern
 *crusculus maculatus* Garman 1888
 Range: Cayman Brac and Little Cayman.

DISCUSSION

As the key indicates, and as Grant (1940b) has previously emphasized, the four species fall into two groups—one long-legged, the other short-legged. This may be a quite natural grouping, in these islands at least.

In the long-legged group the two species, although similar in general body proportions, differ in several characters. The relatively widespread *C. hewardii* is a stockier, blunt-snouted lizard, its dorsum with dark brown broken bars on a light brown background, its throat mottled, 12-19 lamellae on fourth toe, 4 pairs of chin-shields. *C. duquesneyi*, confined to Portland Ridge, is a more slender lizard with a pointed snout, its dorsal pattern similar to *hewardii* but lighter (specimens collected in same year), background tan with light brown bars, the throat immaculate, 21-22 lamellae on fourth toe, 5-7 pairs of chin-shields. Unquestionably *C. duquesneyi* is a distinct species. M.C.Z. 45181 from Portland

Ridge was misidentified as *hewardii* but proved easily separable from a *hewardii* with the same locality data despite the loss in 45181 of the blue tail so much stressed by Grant as diagnostic for *duquesneyi*.

In the second, short-legged group the series of *C. barbouri* studied included the type and 13 specimens collected by Barbour,¹ all from Mandeville, plus a single specimen from Fern Gulley. One character, dorsal scale count, readily separates *C. barbouri* from *C. cruseculus*.² This difference is very marked and shows no overlap. *Cruseculus* has the lowest dorsal scale count of any Jamaican *Celestus* (mean 101.52, range 89-116); *barbouri* has the highest (mean 132.27, range 127-139). At Mandeville, where the two species are sympatric, *cruseculus* shows a very low mean of 97.64 (range 96-101) and also the strongest divergence of color pattern. The dorsal pattern of *barbouri* consists of a series of dark brown chevrons with the V's pointing caudad. *Cruseculus* shows a variety of patterns: plain tan dorsum with dark brown lateral bands extending the length of the body; a checkerboard dorsal pattern; checkerboard blending into chevrons; chevrons with lateral bands; chevrons only, this pattern almost indistinguishable from *barbouri* in several specimens. At Mandeville, the last type does not occur and the chevrons-with-lateral-stripes pattern occurs only once. These pattern types were established to aid in grouping specimens — gradations and modifications are common.³

C. cruseculus is a variable species also in dorsal, ventral, and midbody scale counts. There is, however, no correlation between scale counts and pattern, and the two Jamaican subspecies proposed by Grant (1940a) on such supposed correlations are therefore here regarded as invalid, *C.c. cundalli* with the type locality Mandeville being untenable on any ground. The Mandeville population cannot be distinguished from that at Kingston, the

1 These were labeled by him as *impressus* Cope. The status of this name is very much in doubt and its disposition will depend on a new evaluation of the types in the Philadelphia Academy.

2 Ventral scale counts are, as usual, fully parallel to dorsal scale counts and not really an independent variable.

3 Another color difference has been pointed out to me by Garth Underwood. The side of the neck in *barbouri* bears rather large pearly spots as compared with smaller punctations in *cruseculus*.

type locality of *crusculus*. *C.c. molesworthi* is more nearly justifiable. Specimens from the area ascribed to this latter subspecies, Boston Bay, Ecclesdown and Buff Bay in northeastern Jamaica, show exceptionally high dorsal counts. However a total of five localities shows a count higher than the average for the species as a whole: Boston Bay (mean 109.4) and Ecclesdown (mean 106.5), on the fringe of the tropical rain forest on the eastern side of the island which may act as an isolate; Balaclava (mean 110.5), about 15 miles northwest of Mandeville; Bogwalk and Mona, close to Kingston. The coefficients of difference (C.D.) were calculated for Ecclesdown-Boston Bay and Balaclava compared to both Mandeville and the species as a whole:

	Boston Bay-Ecclesdown	Balaclava
Mandeville	C.D. = 1.57	C.D. = 2.32
entire species	C.D. = .676	C.D. = 1.01

As is to be expected, as compared to the entire species, the C.D. is not significant. The Ecclesdown-Boston Bay and Balaclava populations are sufficiently different from the Mandeville population as determined by the C.D. that in the opinion of some they might well be considered subspecies. Subspecific rank has not been accepted for these populations for two reasons: the samples are so small that there is no probability that the sample mean equals the population mean; furthermore, considered for the Jamaican populations as a whole the distribution of high or low dorsal counts seem to be random. The midbody scale counts are also higher in the northeast populations, but again samples are small, and high and low mean counts are merely the extremes of a cline in which there is overlap between even the southeast and northeast populations.

Celestus maculatus of Cayman Brac and Little Cayman, retained by Chapman Grant as a full species, does not differ from *C. crusculus* in scale counts or measurements but does differ in one detail of color — the coloring of the dorsal side of the tail. In *C. maculatus* the tail is light tan or ivory in alcohol and so without pattern; in *C. crusculus* of Jamaica the dorsal color and pattern are continued on to the tail. In other respects the coloration of *C. maculatus* falls within the range of Jamaican *crusculus*, and its low scale counts resemble the Mandeville population of the latter. The Cayman population must be regarded as con-

specific with Jamaican populations but because of the tail color difference it may be recognized as a distinct subspecies, *C. cruscus maculatus*.

SUMMARY

1. Four species of *Celestus* occur on Jamaica.
2. They may be arranged in two groups: the *hewardii* group (long-legged group) made up of *C. hewardii* and *C. duquesneyi*, and the *cruscus* group (short-legged group) comprising *C. cruscus* and *C. barbouri*.
3. *C. hewardii*, *C. cruscus* and *C. barbouri* are sympatric at Mandeville.
4. *C. hewardii* and *C. duquesneyi* (sympatric at Portland Ridge) can be distinguished by habitus, coloration, lamellar count and number of chin shields.
5. *C. barbouri* and *C. cruscus* can be distinguished by dorsal scale count.
6. *C. cruscus* is extremely variable and composed of two subspecies: *C. cruscus cruscus* occurring on Jamaica and *C. cruscus maculatus* occurring on Cayman Brac and Little Cayman. There may be a third subspecies *C. cruscus molesworthi*, distinguishable by high dorsal scale counts and found in north-eastern Jamaica. Its validity is, however, not yet firmly demonstrated.

I wish to express my thanks to Dr. Ernst Mayr and Dr. E. E. Williams for their generous and valuable advice, to Mr. Benjamin Shreve who made the scale counts and measurements on the specimen of *Celestus barbouri* from Fern Gulley, and to Mr. Garth Underwood for useful criticism of the manuscript.

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